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| ARENT FOX LLP 1050 CONNECTICUT AVENUE, N.W. SUITE 400 WASHINGTON, DC 20036 | | | EXAMINER OCHYLSKI, RYAN M | |
| | | | ART UNIT 1791 | PAPER NUMBER |
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Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

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Office Action Summary

Application No.

10/539,775

Applicant(s)

SCHROETER ET AL.

Examiner

RYAN OCHYLSKI

Art Unit

1791

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 05 May 2009.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-17 is/are pending in the application.
- 4a) Of the above claim(s) 12-17 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-11 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 20 June 2005 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-8508)
- 4) ☐ Interview Summary (PTO-413)
- 5) ☐ Notice of Informal Patent Application
- 6) ☐ Other: _____
- Paper No(s)/Mail Date _____

DETAILED ACTION

1. This is a FINAL Office Action in response to Applicant's reply of May 5, 2009, which was in reply to a non-final Office Action mailed on February 2, 2009. Claims 1, 4, and 11 have been amended, no Claims have been added or canceled.

Drawings

2. The drawings are objected to because the sole Figure in the instant application is labeled "Figure 1" when it should be merely labeled --Figure-- without "1" following thereafter. Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Specification

3. The disclosure is objected to because of the following informalities wherein appropriate correction is required.
- The instant specification contains no subheadings (e.g. "Background of the Invention" and "Summary of the Invention")
 - References to "Figure 1" on Page 20 should be replaced with reference merely to --the Figure--

Claim Objections

4. Claims 2 and 11 are objected to because of the following informalities wherein appropriate correction is required.
5. Claim 2 Lines 1-2 recite "the heat" for which there is no proper antecedent basis in Claim 1. For the purposes of examination, the Examiner presumes Claim 2 to read -- wherein the thermal energy is supplied to the polymer or heat is removed from the polymer during the method.---
6. The Examiner suggests for the sake of clarity that --deformed-- be inserted before "polymer" in Line 2 of Claim 11 so that it is clear that the method of Claim 1 is not being carried out on the fibers or injection molding of Claim 11.

Claim Rejections - 35 USC § 103

7. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

8. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

9. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

10. Claims 1-4 and 7-10 are rejected under 35 U.S.C. 103(a) as being unpatentable over Eckl et al. (US 6,478,494) in view of Olsen (US 5,780,524).

11. Regarding Claims 1-4 and 7-9, Eckl et al. teach a method for the plastic deformation of polymers, including the polysaccharide chitin which is capable of forming intermolecular hydrogen bridge bonds (as per Column 2 Lines 15-35), comprising

simultaneously treating the polymers with pressure and shearing and thermal energy supplied to the polymer, wherein the method is carried out at relatively low temperatures ("It is possible to considerably reduce the extrusion temperatures through adding native oils or waxes which reduce the melting or flow transition regions of the polymers such that the polymer undergoes less thermal loading during processing" Column 2 Lines 61-67, wherein the Examiner considers the extrusion process to simultaneously supply pressure and shearing).

However, while Eckl et al. suggest that there may be a region in the extruder where the deformation happens below the polymer's melting point (i.e. the flow transition regions), Eckl et al. do not expressly teach that the method is carried out at a temperature which is below the temperature at which the polymer melts, or that the polymer is treated with laser radiation having a wavelength in the range from 1 to 50 μm .

In analogous art pertaining to polymer shaping, Olsen teaches applying infrared lasers to polymers to heat the polymers via a defined wavelength corresponding to the resonance frequency of the polymer such that the polymer is heated to about five percent below the melting point of the polymer for the benefit of providing a non-contact heat source that allows a polymer to be deformed at less than its melting point (Abstract and Column 4 Lines 33-49).

Therefore, it would have been obvious to a person having ordinary skill in the art at the time of the invention to apply Olsen's laser to Eckl et al. for the benefit of

providing a non-contact heat source that allows a polymer to be deformed at less than its melting point.

While this hypothetical combination does not expressly teach that the laser radiation has a wavelength in the range from 1 to 50 μm , it would have been obvious to one having ordinary skill in the art at the time of the invention to use such wavelengths, since it has been held that discovering an optimum value of a result effective variable involves only routine skill in the art (*In re Boesch*). One would have been motivated to use a in the range from 1 to 50 μm for the benefit of operating the laser at the appropriate resonant frequency to deform chitin such that it could be processed below the temperature at which it melts.

12. Regarding Claim 10, while Eckl et al. do not specifically discuss unmodified cellulose as a material that either could or could not be extruded as taught, the Examiner considers that since cellulose is a well-known natural polymer and Eckl et al.'s process is designed to handle natural polymers (both factsevidenced by Column 3 Lines 16-24 of Eckl et al.), it would have been obvious to a person having ordinary skill in the art at the time of the invention to try substituting cellulose for chitin, lignin, or other natural polymers discussed by Eckl et al. with a reasonable expectation of success, since cellulose is a prominent natural polymer, of which there are a finite number identified.

13. Claim 5 is rejected under 35 U.S.C. 103(a) as being unpatentable over Eckl et al. (US 6,478,494) and Olsen (US 5,780,524) as applied to Claim 1 above, and further in view of Craggs et al. (US 5,095,654).

14. Regarding Claim 5, the previous combination teaches the general method as applied above, but is silent on specific pressures acting on the polymer.

In analogous art pertaining to polymer shaping, Craggs et al. teach that solid phase deformation of comprises applying pressure of 52.5 N/mm^2 for the benefit of providing enough pressure to ensure a constant haul-off speed (Abstract and Column 6 Lines 7-33).

Therefore, it would have been obvious to a person having ordinary skill in the art at the time of the invention to apply pressure as taught by Craggs et al. to the previous combination for the benefit of providing enough pressure to ensure a constant haul-off speed and to make adjustments within the claimed range to optimize the amount of pressure needed to extrude Eckl et al.'s chitin, if necessary, as per *In re Boesch*.

15. Claims 6 and 11 are rejected under 35 U.S.C. 103(a) as being unpatentable over Eckl et al. (US 6,478,494) and Olsen (US 5,780,524) as applied to Claim 1 above, and further in view of Fuisz (US 6,129,926).

16. Regarding Claim 6, the previous combination teaches the general method as applied above, but is silent on specific shear rates acting on the polymer.

In analogous art pertaining to polymer shaping, Fuisz generally teaches that sufficient shearing applied to a polymer results in a "transformation of physical and/or chemical structure without degradation of the material" and that an appropriate shear rate to achieve this effect is in the range from 10^0 to 10^6 s^{-1} -- namely 3600-3800 rpm -- for the above-quoted benefit of transformation without degradation (Abstract and Column 3 Lines 5-15).

Therefore, it would have been obvious to a person having ordinary skill in the art at the time of the invention to apply shear as taught by Fuisz to the previous combination for the benefit of transforming physical and/or chemical structures without degradation of the material and to make adjustments for the rate of shear needed to achieve this effect in chitin, if necessary, as per *In re Boesch*.

17. Regarding Claim 11, Eckl et al. teach that the extrusion process produces rod-shaped composite parts, but only Fuisz teaches melt spinning a polymer into fibrous material for the benefit of allowing the addition of a "guest" material to be incorporated into a new thermoplastic material (Column 7 Lines 50-57).

Therefore, it would have been obvious to a person having ordinary skill in the art at the time of the invention to apply Fuisz to the previous combination such that the higher temperature finishing zone of Eckl et al.'s extruder melts the polymer that was previously deformed in a below-melting temperature beginning zone of the extruder (following the general scheme laid out of a 90° C input and 115° C output disclosed by Eckl et al. in Column 3 Lines 44-51), with the polymer then being melt spun using

Fuisz's flash flow equipment for the benefit of allowing the addition of a "guest" material to be incorporated into a new thermoplastic material. (The Examiner notes that at least residual heat from Olsen's laser would contribute to the melting in the higher finishing zone.)

Response to Arguments

18. Applicant's arguments with respect to Claims 1-11 have been considered but are moot in view of the new ground(s) of rejection.

Conclusion

19. Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP

§ 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

20. Any inquiry concerning this communication or earlier communications from the examiner should be directed to RYAN OCHYLSKI whose telephone number is 571-270-7009. The examiner can normally be reached on Monday through Thursday and every other Friday from 9:00-6:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Joseph Del Sole can be reached on 571-272-1130. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

rmo

/Joseph S. Del Sole/
Supervisory Patent Examiner, Art Unit 1791